

The importance of quiet and hospitalization of all cases after operation for a period of two weeks cannot be overestimated. I am sure that it would be better in every large city or section to select one or two ophthalmic surgeons for this special work. Experience in special technique and localization of tears may make the difference of success or failure in these cases. Doctor Barkan is to be congratulated on the good results obtained in his cases.

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DOCTOR BARKAN (Closing).—At the time that this paper comes back to me to close the discussion, several developments in the operation for retinal detachment have taken place which may be briefly stated as follows:

The attempts by Sourdille, Lindner, and Guist to cause broad adherence of the retina by chemical means have, in our opinion, been improved upon and superseded by the electrical methods of Safar of Vienna, Weve of Utrecht, and Larson of Stockholm, and we have been able to convince ourselves through personal experience of their efficacy. By these methods a broad area of retinal adhesion is obtainable and the retinal tear can be walled off or closed with a high degree of probability, thereby obviating the need of the very exact localization and actual striking of the tear which is essential in the method of Gonin.

We wish to thank Doctors Weyman, Roberts, and Irvine for their courtesy and for the interest which their discussions have added to this paper.

## ELECTROCARDIOGRAPHIC FINDINGS IN CORONARY ARTERY DISEASE\*

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DISCUSSION by J. F. Anderson, M.D., Los Angeles;  
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IT would be difficult indeed to evaluate the importance of the progress made in the study of diseases of the coronary arteries by means of the electrocardiograph during the last two decades. The numerous contributions to our knowledge on this subject depict a most interesting story of the advancement of science and the perfection of diagnosis of a disease until recently unrecognized.

### CONTRIBUTIONS RECORDED IN LITERATURE

As early as 1909 Eppinger and Rothberger<sup>1</sup> described alterations of the QRS and T-waves, caused by destroying part of the left ventricular musculature by silver nitrate.

In 1920 Pardee<sup>2</sup> reported an electrocardiographic sign of coronary artery obstruction which has become the most characteristic and popularly accepted criterion for the graphic diagnosis and includes a V-shaped inversion of the T-wave; low amplitude of the ventricular complexes; a high take-off and a peculiar arching of the T-wave. Other significant abnormalities frequently found include: a widening of the QRS complex associated with notching or splintering, and an increase in the AV conduction and the development of the prominent Q-wave in Lead 3 as described by Brown, Levine, and Pardee. These observa-

tions have, to a large extent, been confirmed by Smith,<sup>3</sup> Willius,<sup>4</sup> Wearn,<sup>5</sup> Levine,<sup>6</sup> Wiggers,<sup>7</sup> Barnes and Whitten,<sup>8</sup> and particularly by Parkinson and Bedford.<sup>9</sup> Barnes<sup>10</sup> has pointed out that T-wave negativity could result not only from coronary arteriosclerosis, but from various injuries to the myocardium, the result of strain predominantly of either the right or the left ventricle; also that such strain need not be manifested in the myocardium except as hypertrophy or dilatation of one or the other ventricles. It was further established by these same workers that strain predominantly of the left ventricle was associated with inversion of the T-waves in Lead 1 or Leads 1 and 2; strain predominantly of the right ventricle with inversion of the T-waves in the combined Leads 2 and 3. More recently Barnes and Mann<sup>11</sup> have established by animal experiments that probably the left and right ventricles act as separate units, as far as the effect on the RS-T segment of the electrocardiograph is concerned.

Parkinson and Bedford found deviations of the RT and ST segments occurring early in most cases of one hundred studies of coronary thrombosis, and also found a negative T wave following later during the course of the illness. The RT and ST elevations and depressions were best seen in the first and third leads and were opposite in direction. The T-wave in some cases became evident before the RT segment returned to the iso-electric line, in which case the direction of the T-wave was always opposite to that of the RT segment. They further found that within two or three weeks after the onset of infarction the RT segment had usually returned to the iso-electric level and the T-waves were fully developed in all leads.

### PITFALLS

Our knowledge of the graphic interpretation of coronary disease has been rapid but not without many pitfalls. There has frequently been a tendency on the part of overenthusiastic physicians to read too much into the cardiographic records on the one hand and to pay too little attention to the history and clinical findings on the other. It should be emphasized that the history still remains the most important aid to prognosis, and even treatment in many cases.

One must be particularly guarded in making the statement that coronary artery disease is not or has not been present from merely reading one electrocardiogram. This point is well brought out by Levine and Holland,<sup>12</sup> who report a study of 328 cases of coronary occlusion, with only thirty-five showing normal tracings at one time or another following the acute attack.

The variability of the character of the tracings is brought out by these men and is well known to all cardiologists who are able to have daily or frequent electrocardiograms taken during the acute and subacute stages of an occlusion. Some cases may show no changes in the tracings during the first twenty-four or even forty-eight hours of an acute coronary obstruction, but show quite marked

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and characteristic ST and T-wave abnormalities within a week. On the contrary, however, most cases will show marked changes at the onset, with a return toward normal on improvement in the patients' condition.

Many and various cardiac irregularities may be associated with the more characteristic findings above described, and in this series several cases of complete heart-block associated with an acute coronary thrombosis are shown. Other of the more common types of irregularities occur frequently.

In 1929 I<sup>13</sup> reported several cases of acute coronary occlusion wherein the T-waves had been restored to the normal upright position over a period of time. Some of these patients are still showing changes from time to time several years after the original trouble. These minor changes which are prone to undergo changes must not be looked upon too lightly, nor should we disregard the slight abnormalities wherein the patient gives a suggestive history or is complaining of slight precordial pain.

The fact that cardiac infarction may occur in the so-called silent areas of the heart muscle led Wolferth and Wood<sup>14</sup> to report their results in two cases of acute coronary occlusion diagnosed clinically but unsatisfactorily shown by electrocardiographic tracings, except for the appearance of abnormalities in a chest lead which they term Lead 4. Following the technique they used, several patients with known coronary sclerosis were reexamined for abnormalities in Lead 4 in this series. These results were not significant in that no definite abnormalities of importance were found in cases where deviations had already been found in the standard leads.

In a recent report Levy<sup>15</sup> submits an interesting analysis showing the percentage of cases diagnosed as coronary artery disease in relation to the total number of admissions to the medical service of the Presbyterian Hospital of New York City from 1920 to 1929, inclusive. In 1920, of 1886 cases admitted to the medical service of the hospital, twenty, or 1.1 per cent, were diagnosed as coronary artery disease. In 1929, of 2198 cases admitted, ninety-four, or 4.3 per cent, were diagnosed coronary artery disease. The average incidence during the ten-year period was 2.1 per cent.

#### CASES REPORTED IN THIS SERIES

The cases in this series represent 139 cases of coronary disease selected from 1,000 cases of heart disease seen in office practice or in consultation, and include arteriosclerosis of the coronary artery, thrombosis of the coronary artery, and those cases diagnosed as angina pectoris wherein the electrocardiographic evidence seemed to indicate that coronary disease was the probable pathologic factor. The incidence of the disease in this group is only 1.39 per cent. It must be pointed out, however, that these cases were, on the whole, taken from a group of ambulatory patients, while Levy's report deals with bed patients.

#### ANALYSIS OF CASES REPORTED

Two hundred and fifteen abnormalities were found in 139 records:

Inversion of T wave in all leads.....	42
Inversion of T wave in L2 and L3.....	37
Inversion of T wave in L1 and L2.....	12
Inversion of T wave in L3 alone.....	5
Inversion of T wave in L1 alone.....	2
Inversion of T wave in L2 alone.....	0
Inversion of T wave in L1 and L3.....	1
Prominent Q wave in L3.....	10
Interventricular block (arborization).....	38
Complete heart block.....	6
A-V block.....	8
Right bundle branch block.....	8
Left bundle branch block.....	1
Paroxysmal tachycardia (vent).....	4
Auricular fibrillation.....	6
Auricular flutter.....	1
Splintering of the QRS complex.....	5
Ventricular premature contractions.....	5
Left axis deviation.....	33
Right axis deviation.....	1

#### CONCLUSIONS

An analysis of the electrocardiographic abnormalities in 139 cases of coronary artery disease is given.

The presence of the so-called coronary T-wave and other criteria ordinarily accepted are not always necessary in order to make a diagnosis of coronary artery disease.

The most important clinical evidence of pathology in the coronary arterial system is frequently to be found in the alterations occurring in the electrocardiogram.

An accurate prognosis is not always possible, but important prognostic signs can be gathered by studying a series of electrocardiograms taken frequently on the same patient.

1930 Wilshire Boulevard.

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## DISCUSSION

J. F. ANDERSON, M. D. (1930 Wilshire Boulevard, Los Angeles).—I wish to emphasize a few of the points that Doctor Langley has made. In the first place, the importance of not making a diagnosis on an electrocardiogram alone. In some cases it is possible to make a diagnosis on the tracing, and in some it is possible to do so on clinical findings and history. But in either method a grave error may be made. Infections and intoxications may give similar electrocardiographic findings, and symptoms may be misleading. It is by combining the two that by far the best results are obtained. In this case we can often diagnose coronary sclerosis before thrombosis occurs, and by careful management at least postpone a more serious condition. The most valuable findings in the chronic coronary disease are: intraventricular block, as evidenced by widening of the QRS interval beyond .1 second, and bundle-branch block. In the acute cases the earliest and most characteristic finding in the electrocardiogram is displacement of the RT segment. It will take off high on the R in one or two leads, and low on the S in the other lead, or vice versa. This change may be seen in only a few hours after the attack. It is, in turn, followed by the T-wave changes. I think it would be well also to emphasize the fact that the electrocardiographic changes may be slight and may not extend through a long period of time. Thus one normal tracing after an attack, the symptoms of which suggest coronary thrombosis, does not necessarily mean that the patient does not have a coronary occlusion. It is rare indeed, however, that several tracings are negative when the trouble is really present.

There has been much discussion lately about the significance of the large Q-wave in Lead 3. Due to confusion in nomenclature, two main types of complexes are described. In the first place, an inverted R3 (S3) is shown as the large Q, when the application of Einthoven's equation readily identifies it as the former. Thus the tracing shows left-axis deviation, which is significant only if it denotes left ventricular preponderance.

The second type is a diphasic QRS in which the initial phase is directed downward. This variety may become monophasic, however, with respiration, termination of pregnancy, or loss of weight. Occasionally a tracing with normal axis deviation and a large initial downward phase is shown. When found a large Q3 is most frequently seen in cases of coronary disease and left ventricular abnormality. The cause or mechanism of production, however, has not yet been determined. The latest investigators are inclined to the belief that change in the anatomical position of the septum has more to do with its production than deficient blood supply, or myocardial damage.

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WILLIAM DOCK, M. D. (Stanford University Medical School, San Francisco).—There is nothing I can add to Doctor Langley's paper or Doctor Anderson's discussion of the electrocardiographic findings in acute myocardial infarction. It must be emphasized that the string galvanometer is an instrument exactly like the stethoscope in that it extends the examiner's powers of physical examination. Unfortunately it is more expensive than the stethoscope, but in practice it should be used, like the stethoscope, as often as necessary. In cases of typical coronary occlusion it is not necessary to think of the electrocardiogram just as it is not necessary to listen to the heart of a typical case of aortic insufficiency with bobbing neck vessels and a Corrigan pulse. However, most of us still enjoy seeing typical "coronary" tracings or hearing aortic diastolic murmurs. In cases where the diagnosis of coronary disease is doubtful, and where a correct decision is of vital importance, the taking of frequent tracings usually is of great value in furnishing a definite solution of a problem which no other form of physical examination could solve.

ARTHUR STANLEY GRANGER, M. D. (2007 Wilshire Boulevard, Los Angeles).—It will not be amiss to lay a little more stress on one or two points which have been mentioned in Doctor Langley's paper and emphasized by both Doctor Anderson and Doctor Dock in their discussions. We must remember that a very large percentage of patients presenting symptoms of angina pectoris and who, we must assume, have definite coronary disease show absolutely normal electrocardiographic tracings. Many of us have seen such patients turned aside with the diagnosis of either neuritis or neurosis, and at least one or two of them, in my experience, have later died of coronary occlusion. Again, some of the electrocardiographic signs, which are commonly found in coronary disease, may be due to other conditions. Consequently it is essential that we do not rely on the electrocardiograms alone as a means of diagnosis, but try to correlate the electrocardiographic signs with a careful history of the condition together with the physical findings, and in some instances it is necessary to make the diagnosis from the history alone. I am always suspicious of coronary disease in a patient presenting the type of pain which is commonly seen in that condition despite the absence of any positive signs, and in case of doubt it is far better to be mistaken in one's diagnosis than to err in the opposite direction.

## ECZEMA—OBSERVATIONS ON DESENSITIZATION\*

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THE present-day treatment of eczema or dermatitis eczematosa has been radically influenced by the newer concepts of the pathogenesis of this condition. Recent knowledge on this subject points strongly to the conclusion that eczema is not a metabolic disease, but is in the main an allergic one, in the sense that it represents a reaction of a sensitized group of cells to one or more specific excitants. Although it was long believed that sensitization to protein substances was necessary to the production of allergic reactions, we have learned that a reaction of the epidermis, with the production of clinical eczema, may be precipitated by contact with nonprotein substances which are harmless to the normal individual.

As a matter of fact, wide clinical experience shows that sensitivity to exogenous nonprotein substances is the predominant factor in the specific etiology of adult eczema,<sup>1</sup> and that endogenous proteins, such as foods, play a relatively unimportant rôle.<sup>2</sup> In short, the presence of clinical eczema in an individual is strongly indicative of a specific hypersensitiveness of the epidermal cells to an external excitant. It is not within the scope of this paper to present the proofs of this assertion, and the bald statement will have to be supported by references to the above representative articles from the voluminous literature on the subject.

It was the persistent search for endogenous proteins as a specific etiologic basis for eczema that

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